

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
6 May 2005 (06.05.2005)

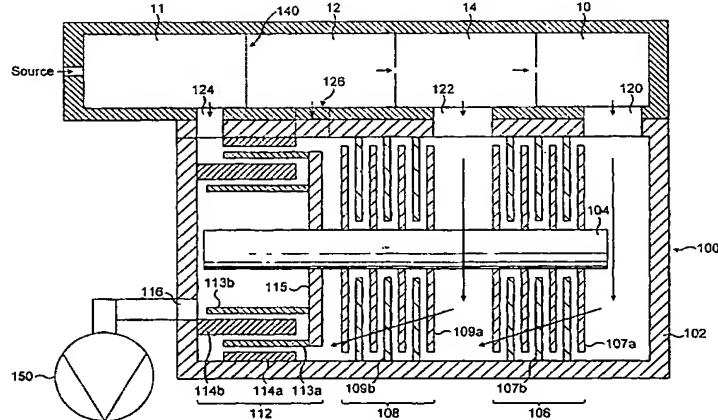
PCT

(10) International Publication Number  
**WO 2005/040615 A2**

- |  |   |  |
|--|---|--|
| (51) International Patent Classification <sup>7</sup> :        | <b>F04D</b>   | [GB/GB]; BOC Edwards, York Road, Burgess Hill, West Sussex RH15 9TT (GB).  |
| (21) International Application Number:                         | PCT/GB2004/004046   | (74) Agent: <b>BOOTH, Andrew, Steven; The BOC Group plc, Chertsey Road, Windlesham, Surrey GU20 6HJ (GB).</b>  |
| (22) International Filing Date:                                | 23 September 2004 (23.09.2004)  | (81) Designated States ( <i>unless otherwise indicated, for every kind of national protection available</i> ): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW. |
| (25) Filing Language:  | English   | (84) Designated States ( <i>unless otherwise indicated, for every kind of regional protection available</i> ): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).  |
| (26) Publication Language:                                     | English   |  |
| (30) Priority Data:  | 0322888.9 30 September 2003 (30.09.2003) GB<br>0409139.3 23 April 2004 (23.04.2004) GB  |  |
| (71) Applicant ( <i>for all designated States except US</i> ): | <b>THE BOC GROUP PLC [GB/GB]; Chertsey Road, Windlesham, Surrey GU20 6HJ (GB).</b>  |  |
| (72) Inventors; and  |   |  |
| (75) Inventors/Applicants ( <i>for US only</i> ):              | <b>STONES, Ian, David [GB/GB]; BOC Edwards, York Road, Burgess Hill, West Sussex RH15 9TT (GB). SCHOFIELD, Nigel, Paul [GB/GB]; BOC Edwards, York Road, Burgess Hill, West Sussex RH15 9TT (GB). STUART, Martin, Nicholas</b> |  |

*[Continued on next page]*

(54) Title: VACUUM PUMP



(57) Abstract: A differentially pumped mass spectrometer system comprises a mass spectrometer having a plurality of pressure chambers; a vacuum pump attached thereto and comprising at least three pump inlets, a first pumping section, a second pumping section downstream from the first pumping section, and a third pumping section downstream from the second pumping section, an outlet from a first, relatively low, pressure chamber being connected to a first pump inlet through which fluid can enter the pump from the first chamber and pass through the first, second and third pumping sections towards a pump outlet, an outlet for a second, medium pressure chamber of the spectrometer being connected to a second pump inlet through which fluid can enter the pump and pass through, of said sections, only the second and third pumping sections towards the pump outlet, and an outlet for a third, highest pressure chamber of the spectrometer being connected to a third pump inlet through which fluid can enter the pump and pass through, of said sections, only at least part of the third pumping section towards the pump outlet; and a backing pump connected to the pump outlet such that, in use, at least 99% of the fluid mass pumped from the spectrometer passes through both the vacuum pump and the backing pump.

WO 2005/040615 A2



**Published:**

- without international search report and to be republished upon receipt of that report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*